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Sensorial Quality of Dietetic Soft Serve Ice-Cream Prepared by Using Different Proportions of Maltodextrin

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A B S T R A C T

An experiment was performed to develop low calorie dietetic soft-serve (softy) ice-cream using carbohydrate based fat replacer. Attempts have been made to replace milk fat in softy ice-cream by incorporation of maltodextrin at the rate of 10, 20, 30 and 40 %. For this investigation five different combinations of maltodextrin such as control (without maltodextrin), T₁ (26.06gm), T₂ (52.12gm), T₃ (78.18gm) and T₄ (104.24gm). Ice cream mixes were evaluated by a panel of six judges for sensory evaluation such as colour, texture, overall acceptability and flavor on and using 9 points hedonic scale. In the present investigation it is concluded that the softy ice cream (T₃) blend was most acceptable than other combinations of Ice-cream. Sample fat have been reduced by 10% using fat replacer, T₃ showed higher rank than the control.

Introduction

Indian dairy emerging very fast and has the world's largest and fastest growing market for milk product. Ice cream is a frozen mixture of a combination of milk solids, sweeteners, stabilizer, emulsifiers, flavors and other ingredients include egg solids, colors and starch products may be used. This mixture, called a mix, is pasteurized and homogenized before freezing. Freezing involves rapid removal of heat while agitating vigorously to incorporate air thus imparting the desirable smoothness and

softness to the frozen product. The term soft-serve has been applied largely because products are marketed in soft form and ready for consumption shortly drawn from freezer. It is sold under the trade name softy ice-cream in our country. Softy ice-cream is delicious, wholesome nutritious, frozen dairy food. It has occupied a unique place in diet of the people in all over the India. Low fat and low calories softy ice cream is becoming more and more popular in the Indian market due to one or more

reasons. Maltodextrin is a polysaccharide made up of D-glucose linked with α (\rightarrow 4) glycosidic bond, moderately sweet or almost flavorless, give 4 kcal/gram. With the changing lifestyle in affluent and technologically developed societies, obesity, diabetes and cardiovascular diseases (CVD) have assumed major health problems. Developing countries like India are also no exception in this regard. A survey conducted by Indian Council of Medical Research (ICMR) reported that 49 per cent of women and 36 per cent of men in urban India are obese (ICMR, 2001). Obesity increases the risk of a number of health conditions including hypertension, adverse lipid concentrations, and type 2 diabetes (1) (Cynthia L. Ogden et al., 2012). Obese persons need to maintain ideal body weight by cutting down on calorie intake. Reduced fat formulations need to be developed for persons suffering from CVD which accounts for around 15 per cent deaths in India and this figure is likely to rise to as high as 40 per cent by 2015 (AIIMS, 2002). India already has the highest number of diabetic patients in the world (50.8 million) and this is projected to increase to 87 million by the year 2030 (Mohan et al., 2010). According to WHO estimates, the diabetic cases in 1995 in the world were 19.4 million, which is expected to increase to about 57.2 million by 2025.

The development of “sugar-free” products can enable such people to relish the dairy products without affecting their blood glucose levels. This is why, recently, a worldwide growing interest of consumers towards a low calorie foods due to aggravated health and nutritional awareness has lead to the appearance of low calorie frozen dessert varieties such as low fat, low sugar, non-fat, cholesterol free, and frozen desserts with low fat and sugar, but giving similar rheological features as standard ice

cream (Suneeta Pinto et al., 2014). Present investigation have been carried out to prepare and standardize the process for dietetic softy ice cream, cheaper in cost, would go a long way in popularizing which nourishing as well as refreshing milk food.

Materials and methods

The materials required for formulations were procured from following sources such as Buffalo milk (Natural), Cream (Amul), Maltodextrin (High media \leq 20DE), Skim Milk Powder (SMP-Murali Brand-Haryana), Cane Sugar Powder, Guar gum (vegetable origin guar beans). Five suitable softy ice cream samples were formulated in different proportions with proper mixing.

The milk and cream used in the manufacture of the softy Ice cream were analyzed for their composition, i.e. fat, total solids, Milk Solid Not Fat and titratable acidity. The quantity of milk, cream, skim milk powder, sucrose, Guar gum (vegetable origin guar beans) and other ingredients maltodextrin $DE \leq 20\%$, etc. required for a batch i.e. 1, 3.5 and 5 kg of softy ice cream mix respectively. The required quantities of various ingredients for each treatment were weighed, mixed and blended thoroughly. Skim milk powder and other dry ingredients were mixed with a part of sugar and added to avoid lump formation before the temperature of the mix reached 50° C. The calculated amount of stabilizer was admixed with sugar and maltodextrin (by weight) and added only when the temperature of the mix reached 65° C. The mixes were further heated to 80° C, homogenized in a clean and sanitized double stage homogenizer at 100 kg/cm^2 and 35 kg/cm^2 pressure in the first and second stage respectively and again pasteurized by holding the mix at 80° C for 25 sec.

Table.1 Formulation of softy ice cream

	MILK (ml)	Cream (gm)	Maltodextrin (gm)	SMP (gm)	Sugar (gm)	Stabilizer (gm)
To	550.6	260	-	50.1	150	04
T1	550.6	234.54	26.06	50.1	150	04
T2	550.6	208.48	52.12	50.1	150	04
T3	550.6	182.42	78.18	50.1	150	04
T4	550.6	156.36	104.24	50.1	150	04

Table.2 Sensory evaluation of softy ice cream

Attributes %	Treatments				
	Control	T₁	T₂	T₃	T₄
Colour	7.83±0.28	7.88±0.10	7.44±0.51	8.16±0.29	6.66±0.29
Texture	7.72±0.25	6.83±0.16	7.38±0.53	8.27±0.42	7.77±0.27
Flavor	7.16±0.76	6.88±0.09	6.5±0.5	8.16±0.28	7.61±0.34
Overall acceptability	7.22±0.85	7.16±0.44	6.61±0.54	8.55±0.85	7.55±0.42

Mean ±SD of five replications

Results and Discussion

Sensory evaluation of ice cream prepared from different levels of ingredients as mentioned in materials and methods were subjected to sensory evaluation for colour, texture, flavour, and overall acceptability by trained judges, using 9 point hedonic scale.

Consumers answered an overall liking question using the 9-point hedonic scale and a check-all-that-apply (CATA) consumer question with 13 attributes which described the sensory characteristics of vanilla ice cream. (Lauren Dooley et al. 2010).

Colour and appearance: It is evident from Table 01 that, the mean colour score for different treatment of ice cream ranged from 6.66 to 8.16. The data shows that treatment T₃ scored the highest score compared to T₁, Control, T₂ and T₄. It was observed that addition of maltodextrin the

colour of softy ice cream is remain same. There were no significant differences amongst all the treatments for colour score.

Using polydextrose, maltodextrin or their equal combination did not effect color and appearance of ice creams (P>0.05) but had a significant effect on the structure, density, taste and smell of ice creams (P<0.05). Nuray Guzeler et al. (2011).

Flavour: Mean score for flavour ranged from 6.5 to 8.16. The score of flavour for treatment T₃ scored the highest score. The treatment T₂ scored lowest score followed by T₁, and control. All the treatments were ranked in between like very much to like extremely. It was observed from above findings that as the percentage of addition of maltodextrin the flavor of softy ice cream isremains same. In the final product does not affect on the flavor quality of softy ice cream.

All the ingredients should blend to yield a pleasant, balanced flavour (Bodyfelt et al., 1988). Flavour is the single most important characteristic in deciding the acceptability of any product.

Texture: Table 01 shows the mean score for the texture quality of softy ice cream after addition of maltodextrin as replacement for the fat which showed no significant effect on the addition. Texture attributes of softy ice cream was in the range of 6.83 to 8.27. The score of texture for treatment T₃ scored the highest score i.e. 8.27±0.42 followed by T₄, Control, T₂ and T₁ with 7.77±0.27, 7.72±0.25, 7.38±0.53 and 6.83±0.16 respectively. By replacing maltodextrin 30% (T₃) we get excellent result in texture, in body over acceptability.

A coarse texture is the most frequently cited defect in ice cream (Marshall and Arbuckle, 1996) large crystal growth during freezing restricted and hardness decreased. Cottrell et al. (1980) also indicated that polysaccharides restricted ice crystal growth during storage and increased the viscosity of the mix.

Overall Acceptability: It is evident from Table 01 that the overall acceptability score of softy ice cream for various treatments varied between 6.61 to 8.55. Addition of maltodextrin significantly affected on the quality of softy ice cream therefore it showed the effect on various treatments of ice cream. The mean overall acceptability score for treatment control, T₁, T₂, and T₄ was 7.22, 7.16, 6.61 and 7.55, respectively. The treatment T₃(8.55) was most acceptable by the judges, so blending of 550.6 ml of milk, 182.42 gm of cream, 78.18 gm of maltodextrin, 50.1 gm SMP and 150 gm of sugar in the blend was most acceptable than other treatment

combinations. Maltodextrin provides same taste as fats and helps foods to easily be broken into smaller piece in the mouth, it can a viable alternative for the fats used in the food industry (Guzeler et al., 2011).

Conclusions

With the changing lifestyle in affluent and technologically developed societies, obesity, diabetes and cardiovascular diseases (CVD) have assumed major health problems. Obesity is associated with many health implications like hyperlipidimia, hypercholesterolemia, diabetes, hypertension, cancer, gallstones, etc. Obese persons need to maintain ideal body weight by cutting down on calorie intake. Reduced fat formulations need to be developed for persons suffering from CVD. Therefore from the present investigation it is concluded that the softy ice cream with blending of 550.6 ml of milk, 182.42 gm of cream, 78.18 gm of maltodextrin, 50.1 gm SMP, 4 gm Guar gum (as a stabilizer) and 150 gm of sugar in the blend was most acceptable than other treatment combinations.

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